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(71) Applicant:
MAGNETI MARELLI S.p.A.
20145 Milano (IT)

(72) Inventors:
- **Ressia, Alessio**
  10073 Cirie' (IT)
- **D'Alessandro, Domenico**
  10122 Torino (IT)

(74) Representative:
Eccetto, Mauro et al
Studio Torta S.r.l.,
Via Viotti, 9
10121 Torino (IT)

(54) Position adjusting device for a vehicle headlamp

(57) A position adjusting device (1) for a vehicle headlamp (2) in which a single sliding member (9) adapted to cooperate with a reflector (5) of the headlamp in order to vary its orientation, is moved in translation along a predetermined sliding axis (12) selectively by first and second actuator means (10, 11) which are separate and independent from one another but act along the same sliding axis (12) (substantially coinciding with a longitudinal axis of the sliding member (9)); the first actuator means (10) are preferably housed in their entirety in a main body (3) of the headlamp (2) and are electrically actuated, while the second actuator means (11) which are manually operated are disposed at least partially outside the main body (3) and are readily accessible by an operator.

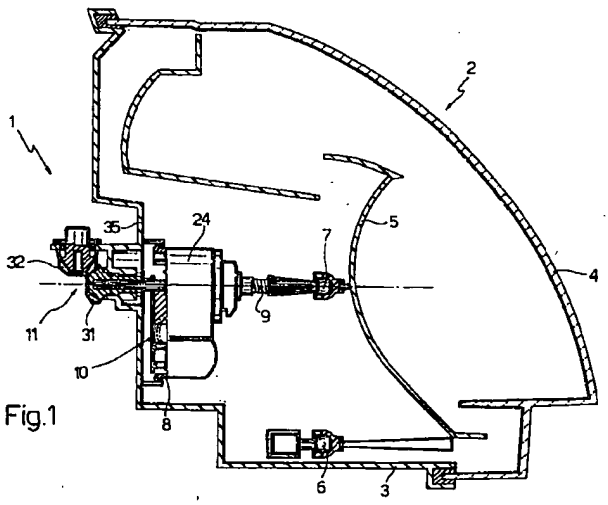

Fig.1

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Description

[0001] The present invention relates to a position adjusting device for a vehicle headlamp.

[0002] Headlamps for vehicles are known in which an electrically actuated position correcting device is entirely housed within a main body of the headlamp: the moving member of the position corrector (typically a sliding pin with a spherical head) cooperates with the reflector of the headlamp causing it to tilt and therefore to vary its orientation; the reflector is normally connected at three points, one of which is formed by the point of action of the position corrector.

[0003] Headlamps are also known with automatic internal position correctors provided with further auxiliary adjustment systems that are manually controlled (for instance by means of threaded members) and which are needed, for instance, during the assembly of the headlamp on the vehicle in order to recover assembly tolerances or in the event of malfunction of the electrical system; according to these known solutions, the manual adjustment of the orientation of the reflector is carried out by acting separately on two separate adjustment members cooperating respectively with the two points of connection of the reflector that are not engaged by the automatic position corrector.

[0004] The point of connection on which the automatic position corrector acts is not in fact available for coupling with a further manual member and acts, during manual adjustment, as a fixed point: it is therefore necessary to act on two members (for instance two screws) disposed on separate axes in order manually to adjust the reflector.

[0005] The main drawback of the devices of the type described above is therefore that they require the operator, during manual adjustment of the orientation of the reflector, to act on two separate points of action; they are also relatively complex and costly to manufacture and assemble and require the use of two separate manual adjustment members disposed in different positions.

[0006] The object of the present invention is to provide a position adjusting device for a vehicle headlamp which is free from the above-mentioned drawbacks of known devices: an object of the invention is in particular to provide a device that includes an automatic position corrector which is, for instance, electrically actuated, and a manual adjustment system that is readily accessible by an operator and requires the operator to act on a single control member and which is simple and economic to produce and easy to assemble.

[0007] This object is achieved by the present invention, which relates to a position adjusting device for a vehicle headlamp comprising a support structure borne rigidly by a main body of the headlamp, a member sliding with respect to this support structure and adapted to cooperate with a reflector of the headlamp in order to vary the orientation of this reflector with respect to the main body, and first actuator means acting on this sliding member along a predetermined sliding axis in order to move the sliding member in translation with respect to the support structure along this predetermined sliding axis, characterised in that it comprises second actuator means, separate and independent from the first actuator means, acting on the sliding member along the same sliding axis along which the first actuator means act in order to move this sliding member in translation with respect to the support structure along this sliding axis, the sliding member being caused to move in translation along this sliding axis selectively by these first and second actuator means.

[0008] The first actuator means are preferably housed in their entirety within the main body of the headlamp, the second actuator means being disposed at least partially outside this main body.

[0009] The position adjusting device of the invention therefore incorporates a traditional position corrector, for instance an automatic position corrector of an electrically actuated type that can be fully housed within the main body of the headlamp, with a manual adjustment system acting separately and independently from the automatic position corrector but along the same sliding axis as the latter: in this way, manual adjustment may be carried out by acting on a single adjustment member, making use of the same point of action as the automatic position corrector, with a smaller number of components (and therefore lower costs) and in a simpler and more rapid manner than with known solutions.

[0010] Further characteristic features and advantages of the present invention are set out in the following description of a non-limiting embodiment made with reference to the accompanying drawings, in which:

Fig. 1 is a view, partially in section, of a vehicle headlamp provided with an adjustment device of the invention;
Fig. 2 is a view in section through the adjustment device of Fig. 1, on an enlarged scale.

[0011] In Figs. 1 and 2, a position adjusting device for a vehicle headlamp 2 is shown overall by 1.

[0012] The headlamp 2, substantially of a known type and shown only diagrammatically in Fig. 1, comprises a main body 3 closed at the front by a transparent screen 4; the various lighting and adjustment members of the headlamp are housed within the main body 3 and in particular include a reflector 5 that can be oriented with respect to the main body 3 in order to vary the position of the light beam transmitted by the headlamp 2.

[0013] For this purpose, the reflector 5 can move with respect to the main body 3 of the headlamp 2 to which it is connected in a substantially known manner, for instance by means of at least two spherical joints 6 and 7: the orientation of the reflector 5 with respect to the main body 3 may be varied, as will be explained below, by keeping the spherical joint 6 fixed and displacing the spherical joint 7 by means of the position adjusting

device 1, thereby causing the reflector 5 to tilt.

[0014] According to the invention, the position adjusting device 1 comprises a support structure 8, a sliding member 9 that can move with respect to the support structure 8 and is adapted to cooperate with the reflector 5 in order to vary its orientation, and two separate adjustment mechanisms 10, 11, both acting on the sliding member 9 in order to cause it to move in translation along a predetermined sliding axis.

[0015] In the non-limiting embodiment shown in Figs. 1 and 2, the sliding member is a substantially cylindrical pin sliding axially with respect to the support structure 8, and the predetermined sliding axis along which the adjustment mechanisms 10, 11 act substantially coincides with a longitudinal axis 12 of the pin 9.

[0016] The pin 9 is provided, at a first axial end 13, with a spherical head 14 for connection to a relative spherical seat 15 rigid with the reflector 5 and defining therewith the spherical joint 7. The pin 9 is further provided, at a predetermined distance from its axial end 13, with a threaded portion 16 of predetermined length and, at an axial end 17, opposite the axial end 13, with an end portion 18 having a substantially cross-shaped section having four axial grooves 19 spaced equally from one another and provided on an outer lateral surface of this end portion 18.

[0017] The adjustment mechanism 10 is an electrically actuated mechanism of a substantially known type which is shown only diagrammatically in Figs. 1 and 2 for simplicity: an electric motor 20, controlled from a remote position (for instance the passenger space of the vehicle) acts, by means of appropriate transmission members (known and not described in detail for simplicity), on an intermediate member 21 that can move with respect to the support structure 8.

[0018] The intermediate member 21 in particular comprises a tubular body 22 whose interior forms a threaded seat 23 into which the threaded portion 16 of the pin 9 is inserted over a predetermined section by means of a male-female coupling.

[0019] According to the preferred embodiment shown in Figs. 1 and 2, the support structure 8 is shaped such that it forms a container housing 24 inside which there is an open cavity 25 within which the adjustment mechanism 10 is housed; the container housing 24 has a front wall 26 that faces, in operation, the reflector 5 and a rear opening 27 bounded by a peripheral edge 28.

[0020] A through hole 29, into which the tubular body 22 of the intermediate member 21 is inserted in a sliding manner, is provided through the front wall 26.

[0021] The support structure 8 is further provided with means 30 for snap locking to the main body 3 of the headlamp 2, of known type and possibly provided with known sealing members.

[0022] The adjustment mechanism 11 of the position adjusting device 1 of the invention comprises a pair of conical toothed wheels 31, 32 having incident axes and engaging with one another; the conical toothed wheel 31 is rigidly connected to one end of a sleeve 33 inserted idly in a cylindrical housing 34 rigid with the main body 3 of the headlamp 2 and provided, for instance, through a base wall 35 of the main body 3 and disposed substantially in alignment with the through hole 29 of the container housing 24; the conical toothed wheel 32 is rigid with a hub 36, mounted in a rotary manner with respect to a support 37 rigid with the main body 3: in the non-limiting embodiment of Figs. 1 and 2, the support 37 extends in a snap-locking manner from the base wall 35 of the main body 3 externally to the latter, the hub 36 is disposed within the support 37 with a vertical axis and the conical toothed wheels 31, 32 engage with one another at right angles.

[0023] The conical toothed wheel 31 is connected, via the sleeve 33, in an angularly rigid and axially sliding manner with the end portion 18 of the pin 9: the end portion 18 is therefore inserted in an axially sliding manner into the sleeve 33 which is provided in turn with four longitudinal projections 39 which extend radially in a snap-locking manner from an inner lateral wall 38 thereof and engage the axial grooves 19 of the end portion 18 of the pin 9, making the latter angularly rigid with the sleeve 33.

[0024] The sleeve 33 to which the conical toothed wheel 31 is rigidly connected is preferably provided with sealing means adapted to cooperate in a fluid-tight manner with the cylindrical housing 34 into which the sleeve 33 is inserted in a rotary manner: for instance, as shown in Figs. 1 and 2, the sleeve 33 is provided with a sealing ring 40 of elastomeric material housed within an appropriate peripheral seat 41 provided on an outer lateral wall of the sleeve 33.

[0025] The hub 36 rigid with the conical toothed wheel 32 is in contrast provided with manual control means 43 enabling an operator to rotate the conical toothed wheel 32: for instance, as shown in Fig. 2, a tool 44 (for instance a screwdriver) may be inserted in the hub 36; when this tool is turned, the conical toothed wheel 32 and consequently the conical toothed wheel 31 coupled thereto are caused to rotate.

[0026] The conical toothed wheel 32 is further provided with anti-slip means 45, for instance elastic flanges of a substantially known type, which enable the conical toothed wheel 32 to be inserted through the support 37, but which prevent it from slipping.

[0027] During assembly, the support structure 8 forming the container housing 24, in which the adjustment mechanism 10, the pin 9 and the relative intermediate member 21 (which forms a male-female coupling with the pin 9) are previously housed, forms a pre-assembled unit that can be readily mounted on the main body 3 of the headlamp 2 by means of the snap- locking fastening means 30.

[0028] Once the support structure 8 is mounted on the main body 3, the cavity 25 within the container housing 24 is closed by the base wall 35 of the main body 3, ensuring that the components housed therein, in partic-

ular the adjustment mechanism 10, are protected against any external agents.

[0029] The conical toothed wheel 31 is then inserted into the relative cylindrical housing 34 via the sleeve 33 rigid therewith and then coupled to the pin 9 by inserting the end portion 18 of this pin into the sleeve 33. Lastly, the insertion of the conical toothed wheel 32 into the support 37 and its engagement with the conical toothed wheel 32 ensures that the entire position adjusting device 1 is axially locked.

[0030] In operation, the position adjusting device 1 offers two separate adjustment possibilities that can be carried out independently of one another by means of the adjustment mechanisms 10 and 11 which in substance form respective first and second actuator means acting on the sliding member (pin) 9 in order to move this pin in translation with respect to the support structure 8 along the sliding axis 12 which substantially coincides with a longitudinal axis of this sliding member 9.

[0031] The separate and independent first and second actuator means 10 and 11 therefore act on the sliding member along the same sliding axis 12 in order to move it in translation with respect to the support structure 8 along this axis: the sliding member 9 is therefore moved in translation along the sliding axis 12 selectively by the first actuator means 10 or by the second actuator means 11.

[0032] The first actuator means 10 are electrically actuated and housed in their entirety within the main body 3 of the headlamp 2, and operate in a completely analogous way to conventional automatic position correctors that are currently commercially available: in particular, they act on the sliding member 9 by means of the intermediate member 21 that can move with respect to the support structure 8 and is rigid with the sliding member 9, thereby causing this sliding member to move in translation along the sliding axis 12.

[0033] The second actuator means 11 are manually controlled and are disposed at least partially outside the main body 3 so that they are readily accessible by an operator when it is necessary manually to correct the position of the reflector 5. The operator, therefore, using the tool 44, acts on the conical coupling formed by the two conical toothed wheels 31, 32 thereby causing the pin 9 to rotate: the male-female coupling of the threaded portion 16 of the pin 9 with the threaded seat 23 of the intermediate member 21, which is fixed with respect to the support structure 8 and therefore the main body 3 of the headlamp 2, causes the pin 9 to move in translation along the sliding axis 12.

[0034] The intermediate member 21 therefore slides rigidly with the sliding member 9 with respect to the support structure 8 as a result of the action of the first actuator means 10, but is fixed with respect to the support structure 8 when the second actuator means 11 act on the sliding member 9.

[0035] In any case, the translation of the sliding member 9, connected to the reflector 5 by the spherical joint 7, varies the orientation of the reflector 5 with respect to the support structure 8 and the main body 3 of the headlamp 2.

[0036] It is evident that many modifications and variations may be made to the device described above provided that they do not depart from the scope of the claims.

Claims

1. A position adjusting device (1) for a vehicle headlamp (2), comprising:

   - a support structure (8) borne rigidly by a main body (3) of this headlamp (2),
   - a member (9) sliding with respect to the support structure (8) and adapted to cooperate with a reflector (5) of the headlamp (2) in order to vary the orientation of this reflector (5) with respect to the main body (3),
   - first actuator means (10) acting on the sliding member (9) along a predetermined sliding axis (12) in order to move the sliding member (9) in translation with respect to the support structure (8) along this predetermined sliding axis (12),

   characterised in that it comprises second actuator means (11), separate and independent from the first actuator means (10), acting on the sliding member (9) along the same sliding axis (12) along which the first actuator means (10) act, in order to move this sliding member (9) in translation with respect to the support structure (8) along this sliding axis (12), the sliding member (9) being moved in translation along this sliding axis (12) selectively by the first and second actuator means (10, 11).

2. A device as claimed in claim 1, characterised in that the first actuator means (10) are housed in their entirety in the main body (3) of the headlamp (2) and in that the second actuator means (11) are disposed at least partially outside the main body (3).

3. A device as claimed in claim 1 or 2, characterised in that the sliding member (9) is a pin sliding axially with respect to the support structure (8) and provided at a first axial end (13) with a spherical head (14) for connection with a relative spherical seat (15) rigid with the reflector (5), the first and the second actuator means (10, 11) being adapted to move the pin (9) in translation along the sliding axis (12) which coincides with a longitudinal axis of this pin (9).

4. A device as claimed in claim 3, characterised in that the first actuator means (10) act on the pin (9) by means of an intermediate member (21) moving with respect to the support structure (8), this pin (9)

being provided, at a predetermined distance from its first axial end (13), with a threaded portion (16) which is inserted into a corresponding internally threaded seat (23) of the intermediate member (21) by means of a male-female coupling, the intermediate member (21) sliding rigidly with the pin (9) with respect to the support structure (8) as a result of the action of the first actuator means (10) and being fixed with respect to the support structure (8) when the second actuator means (11) are acting on the pin (9).

5. A device as claimed in claim 3 or 4, characterised in that the second actuator means (11) comprise first and second conical toothed wheels (31, 32) with incident axes and engaging with one another, the first conical toothed wheel (31) being rigidly connected to one end of a sleeve (33) inserted idly in a cylindrical housing (34) rigid with the main body (3) of the headlamp (2) and the second conical toothed wheel (32) being rigid with a hub (36) mounted in a rotary manner in a support (37) rigid with the main body (3), this hub (36) extending at least partially outside the main body (3).

6. A device as claimed in claim 5, characterised in that the first conical toothed wheel (31) is connected, via the sleeve (33), in an angularly rigid and axially sliding manner with an end portion (18) of the pin (9) disposed at a second axial end (17) of this pin (9) opposite the first axial end (13) provided with the spherical head (14), the end portion (18) of the pin (9) being inserted in a axially sliding manner into the sleeve (33) and being provided with means (19) for angular locking with respect to the sleeve (33).

7. A device as claimed in claim 6, characterised in that the means for the angular locking of the end portion (18) of the pin (9) with respect to the sleeve (33) comprise at least one axial groove (19) provided on an outer lateral surface of this end portion (18) of the pin (9) and at least one longitudinal projection (39) extending radially in a snap-locking manner from an inner lateral surface (38) of the sleeve (33) in order to engage at least this one axial groove (19).

8. A device as claimed in one of claims 5 to 7, characterised in that the support structure (8) has an open inner cavity (25) in which the first actuator means (10) are disposed, the support structure (8) further comprising snap-locking fastening means (30) for the main body (3) of the headlamp (2), the cavity (25) being closed by the base wall (35) of the main body (3) of the headlamp (2) when the support structure (8) is mounted in a snap-locking manner on the main body (3).

9. A device as claimed in claim 8, characterised in that the cylindrical housing (34) into which the sleeve (33) is idly inserted is obtained through the base wall (35) of the main body (3) of the headlamp (2), this sleeve being provided with sealing means (40) adapted to cooperate in a fluid-tight manner with the cylindrical housing (34).

10. A device as claimed in one of claims 5 to 8, characterised in that the hub (36) rigid with the second conical toothed wheel (32) is provided with manual control means (43) adapted to rotate this second conical toothed wheel (32), the second conical toothed wheel (32) being further provided with anti-slip means (45) which enable the second conical toothed wheel (32) to be inserted through the support (37) but prevent it from slipping out.

11. A device as claimed in one of claims 8 to 10, characterised in that the first actuator means (10) are electrically actuated actuator means controlled from a remote position, the support structure (8), in which the first actuator means (10) are housed, forming a preassembled unit that can be mounted on the main body (3) of the headlamp (2) by means of the snap-locking fastening means (30).

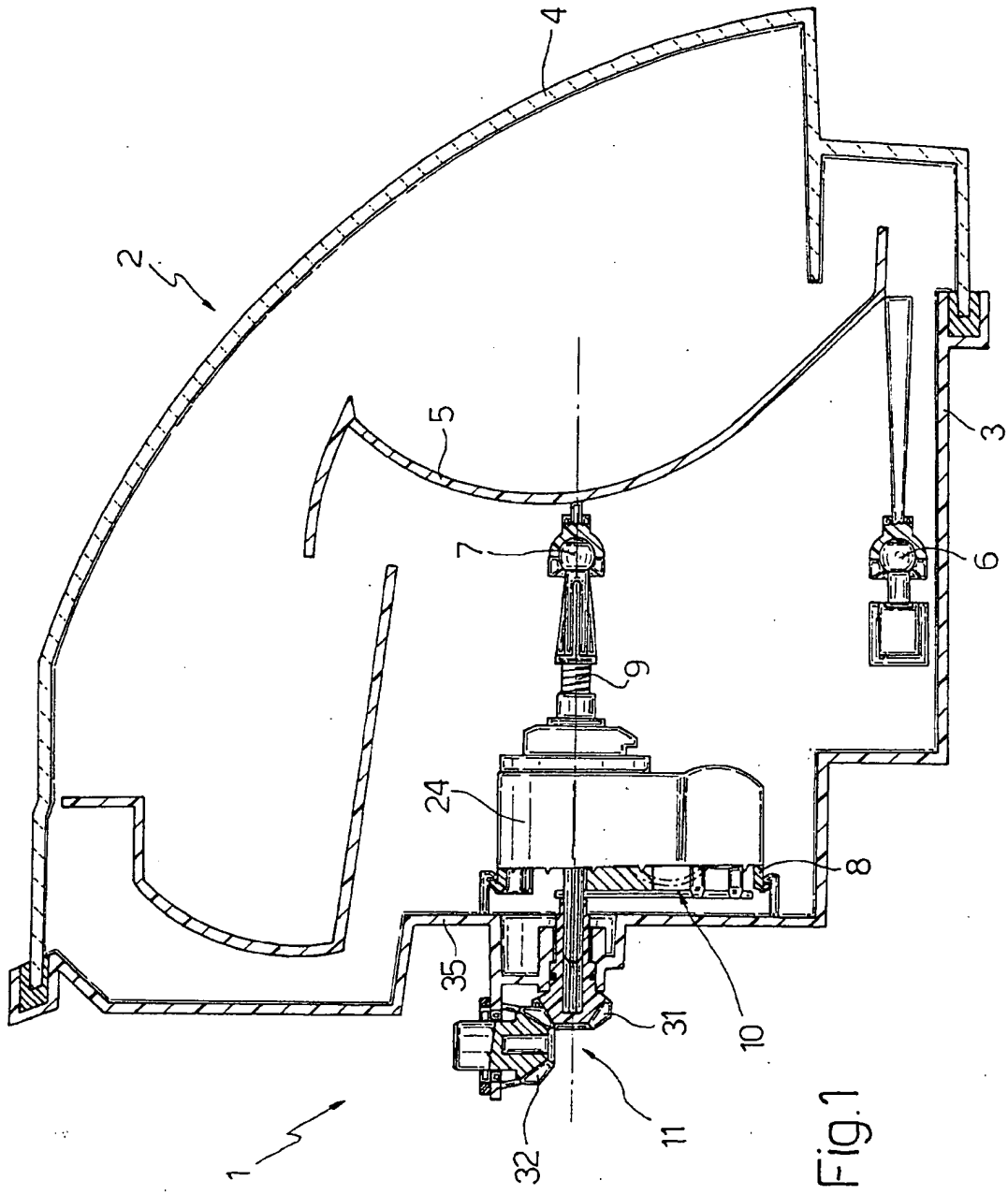

Fig.1

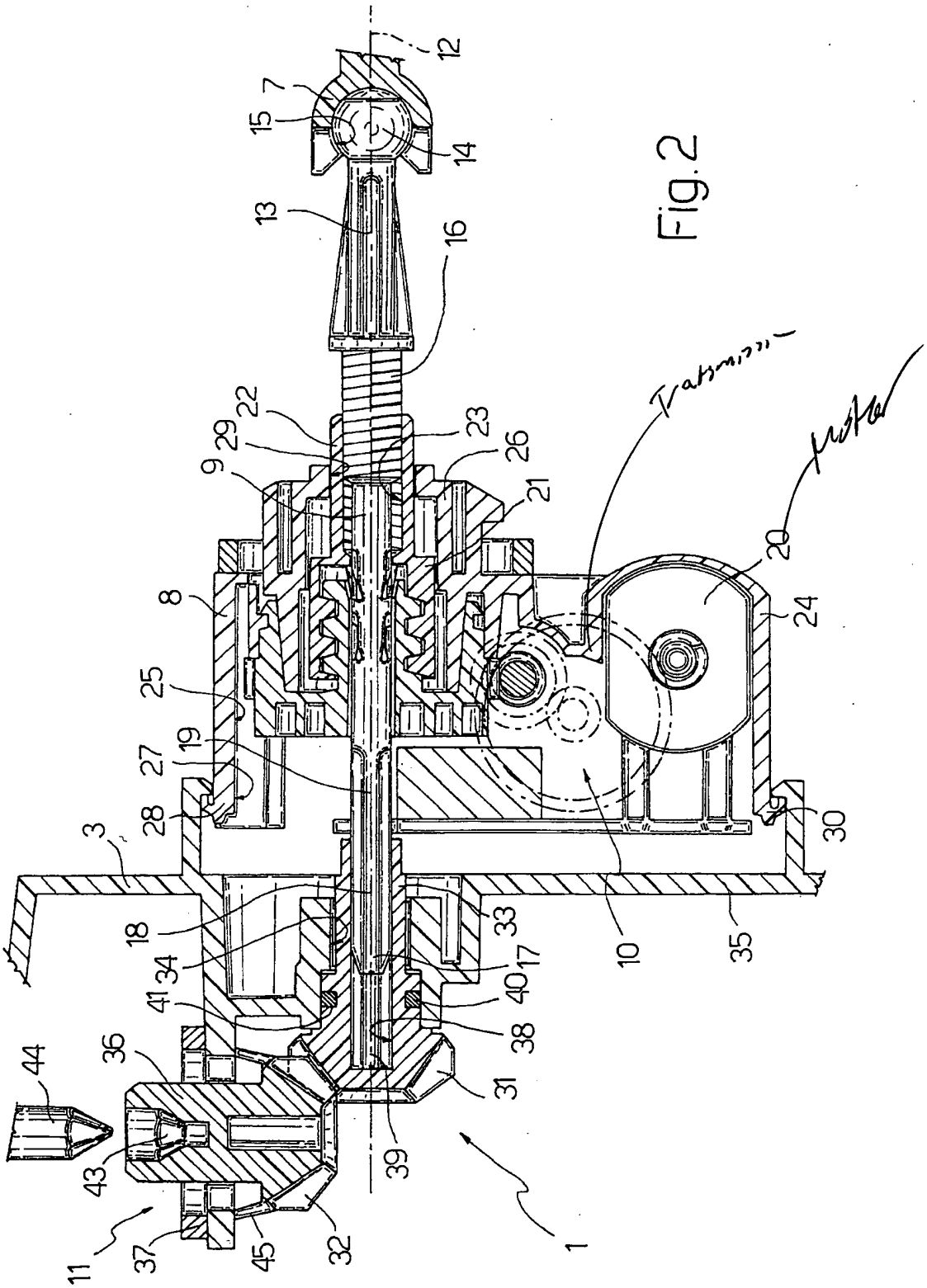
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Fig.2

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EUROPEAN SEARCH REPORT

Application Number
EP 99 10 9520

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 661 192 A (ICHIKOH INDUSTRIES LIMITED) 5 July 1995 * abstract *	1-3	B60Q1/076
A	* figures 1,3,4,7-10 *	9	
X	EP 0 716 954 A (ICHIKOH INDUSTRIES LIMITED) 19 June 1996 * abstract *	1,2	
A	* figures 1,4 *	9	
X	DE 44 20 779 C (HELLA KG HUECK & CO) 22 June 1995 * abstract *	1	
A	* column 5, line 1 - line 40; figure 1 *	4-8,10, 11	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B60Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 June 1999	Onillon, C

CATEGORY OF CITED DOCUMENTS

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